REMARKS

Claims 1-3, 9-12, 17-19, and 38-54 are pending in the application. Claims 41, 47, and 53 have been cancelled. New claims 55-64 have been added. Support for the newly added claims can be found in the original claims as well as in the specification, particularly on page 18. The newly added claims emphasize the importance to the invention that the claimed nucleotide sequences share a high percentage of identity to the exemplary nucleotide sequence set forth in SEQ ID NO:1 and that the polypeptides encoded by nucleotide sequences of the invention have pesticidal activity against at least one pest belonging to the order Coleoptera. No new matter has been added by way of amendment. Reexamination and reconsideration of the claims are respectfully requested.

The Office Action objected to the abstract as not being descriptive of the invention (Office Action of 3/12/03, page 2, #4). The abstract has been amended to address the objection in accordance with the suggestion in the Office Action. Similarly, the Office Action objected to the Title as not being descriptive of the invention (Office Action of 3/12/03, page 2, #5). The title has also been amended to address the objection. Accordingly, Applicants respectfully submit that the title and abstract should be deemed acceptable.

The Office Action objected to the specification as containing sequence disclosures that were noncompliant with 37 CFR 1.821 through 1.825 (Office Action of 3/12/03, pp. 2-3, #6). The specification has been amended so that each mention of the amino acid sequences NGSR, LRMS, and LKMS is accompanied by a sequence identifier. Accordingly, Applicants respectfully submit that the specification should be deemed to comply with the requirements of 37 CFR 1.821 through 1.825.

The Rejection of Claims Under 35 U.S.C.§112, First Paragraph, Should Be Withdrawn

The Office Action (3/12/03, page 3, #8) has rejected claims 1-3, 9-12, 17-19, 38, 41-43, 46-49, and 52-54 under 35 U.S.C. §112, first paragraph, because "the specification...does not reasonably provide enablement for any nucleic acid that has 90% identity to SEQ ID NO:1...."

While the rejection has not been raised against newly submitted claims 55-64, the rejection will be addressed in so far as it may apply to the newly submitted claims. Applicants respectfully traverse this rejection. Applicants note that independent claims 1, 42, 48, and 54 (and therefore claims dependent thereon) have been amended to recite that the nucleotide sequence encodes a polypeptide which is pesticidal for at least one pest belonging to the order Coleoptera. In addition, independent claims 42, 48, and 54 have been amended to recite particular hybridization conditions. Support for these amendments is found in the specification, particularly on pages 18-20 and 32.

The Office Action concludes that the specification "does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention commensurate in scope with these claims." The Office Action states that "[t]he instant specification fails to provide guidance for any nucleic acid with 90% identity to SEQ ID NO:1 or that hybridizes to SEQ ID NO:1...."

First, in contrast to the conclusions stated in the Office Action, guidance is provided as to what sequence alterations may be made and still provide a polypeptide species encompassed by the claim. Applicants have provided the exemplary nucleotide sequence of SEQ ID NO:1 and the exemplary amino acid sequence of SEQ ID NO:2. The claimed sequences of the invention vary from this sequence by structural parameters (*i.e.*, percent sequence identity to SEQ ID NO:1). Guidance for determining percent identity of sequences is provided in the specification on pages 33 through 38.

Moreover, amended independent claims 1, 42, 48, and 54 specify that the nucleotide sequence encodes a polypeptide which is pesticidal for at least one pest belonging to the order Coleoptera and therefore these claims (and claims dependent thereon) encompass functional variants. Guidance regarding alterations that allow the sequence to retain the specified pesticidal activity is also provided. See, for example, pages 18 that provides guidance regarding conservative substitutions of amino acids and pages 19-20 that discuss the activity of variants.

In addition, methods for assaying pesticidal activity of proteins are routine in the art and are also described in the specification, for example on pages 8 and 29 and in the experimental section in working examples such as Example 4, (pp. 65-66), Example 6 (p. 67), and Example 7

(p. 69). It is true that some embodiments of the nucleotide sequence which meet the percent identity limitation of the claims may not have the specified pesticidal activity. However, one of skill would readily be able to determine which nucleotide sequences encoded polypeptides having the desired pesticidal activity using methods known in the art and described in the specification. Applicants note that the presence of inoperative embodiments within the scope of the claims do not render the claims invalid. *Atlas Powder Co. v. E.I. duPont de Nemours & Co.*, 750 F.2d 1569, 224 USPQ 409 (Fed. Cir. 1984). Nor would the amount of experimentation required to test a particular polypeptide for pesticidal activity be considered undue by one of skill in the art, as evidenced by the assay results presented in the specification, for example, in working Examples 4, 6, and 7. Similarly, the references cited by the Examiner—Lazar *et al.* (1988) *Mol. Cell. Biol.* 8: 1247-52 and Hill *et al.* (1998) *Biochem. Biophys. Res. Comm.* 244: 573-577—illustrate that one of skill would readily be able to determine whether a particular sequence change affected the function of a protein. Accordingly, one of skill in the art would be able to determine the functionality of polypeptides encompassed by the claimed invention without resorting to undue experimentation.

The Federal Circuit has repeatedly stated that enablement is not precluded by the necessity for some experimentation, so long as the experimentation needed to practice the invention is not undue. *In re Wands* 8 USPQ2d 1400 (Fed Cir 1988). Furthermore, a considerable amount of experimentation is permissible, if it is merely routine, or if the specification provides a reasonable amount of guidance in which the experimentation should proceed. *Id.*

Applicants stress that when evaluating the quantity of experimentation required, the court looks to the amount of experimentation required to practice a single embodiment of the invention, rather than the amount required to practice every embodiment of the invention, as the Office Action implies. For example, in *Wands*, the claims at issue were drawn to immunoassay methods using any monoclonal antibody having a binding affinity for HbsAg of at least 10^{-9} M. The PTO had taken the position that the claim was not enabled as it would take undue experimentation to make the monoclonal antibodies required for the assay. The Federal Circuit reversed and held that the claims were enabled, as the amount of experimentation required to

isolate monoclonal antibodies and screen for those having the correct affinity was not undue. *See Id.* Clearly, the Federal Circuit did not contemplate that every antibody useful in the methods of the claim must be identified. Rather, the court considered the amount of experimentation required to identify one or a few monoclonal antibodies having the required affinity. *See also, Johns Hopkins University v. Cellpro*, 931 F. Supp. 303, 324 (D. Del. 1996), *aff'd in part, vacated in part, and remanded*, 47 USPQ2d 1705 (Fed. Cir. 1998) (stating that "[t]he specification need only enable one mode of making the claimed invention.").

In the instant case, the quantity of experimentation required to practice independent claim 1 amounts to two steps: generating a nucleotide sequence having a least 90% sequence identity to SEQ ID NO:1 and assaying the encoded polypeptide for functional activity. Such assays, while routine in the art, have further been presented in the specification. Similarly, the amount of experimentation needed to practice the other claims is not undue. For example, claim 9 recites a transformed plant comprising a nucleotide construct comprising a nucleotide sequence that has at least 90% sequence identity to the nucleotide sequence set forth in SEQ ID NO:1 and that encodes a polypeptide that is pesticidal for at least one pest belonging to the order Coleoptera. Thus, in addition to the steps required to practice claim 1, claim 9 requires the transformation of a plant. Plant transformation is routine in the art and is also readily achieved by those of skill in the art.

Thus, a rational scheme for practicing the claimed invention is provided. Based on the guidance regarding the exemplary nucleotide and polypeptide sequences of the invention and the methods for determining whether a particular polypeptide has pesticidal activity against at least one insect of the order Coleoptera, the skilled artisan could choose among possible sequence modifications to produce polypeptides within the parameters set forth in the claims and then test these sequence variants to determine if they retained pesticidal activity. Consequently, contrary to the conclusions stated in the Office Action, the quantity of experimentation necessary and the amount of guidance presented in the specification is sufficient to enable the claims. The rejection of the claims under 35 U.S.C. §112, first paragraph, should be withdrawn and Applicants respectfully request that the rejection not be applied to the newly submitted claims.

The Office Action (3/12/03, page 7, point #9) has rejected claims 1-3, 9-12, 17-19, 38, 41-43, 46-49, and 52-54 under 35 U.S.C. §112, first paragraph, "as containing subject matter that was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention." Applicants respectfully traverse this rejection. While the rejection has not been raised against newly submitted claims 55-64, the rejection will be addressed in so far as it may apply to the newly submitted claims.

Applicants note that independent claims 1, 42, 48, and 54 (and therefore claims dependent thereon) have been amended to recite that the nucleotide sequence encodes a polypeptide which is pesticidal for at least one pest belonging to the order Coleoptera. In addition, independent claims 42, 48, and 54 have been amended to recite particular hybridization conditions. Support for these amendments is found in the specification, particularly on pages 18-20 and 32.

Thus, amended independent claims 1, 9, and 17 (and claims dependent thereon) recite that the polypeptide is encoded by a nucleotide sequences having at least 90% sequence identity to the sequence set forth in SEQ ID NO:1, wherein said polypeptide is pesticidal for at least one pest belonging to the order Coleoptera. The Office Action concluded that there is no predictable structure encompassed by the sequences claimed within the genus of sequences having 90% sequence identity to the sequence set forth in SEQ ID NO:1. However, the recitation of at least 90% sequence identity is a *very predictable structure* of the sequences encompassed by the claimed invention.

Amended independent claims 42, 48, and 54 (and thus claims dependent thereon) recite that the claimed nucleotide sequence hybridizes under specified stringent conditions to a nucleic acid consisting of the nucleotide sequence set forth in SEQ ID NO:1, wherein the claimed nucleotide sequence encodes a polypeptide which is pesticidal for at least one pest belonging to the order Coleoptera. Applicants submit that this recitation also provides a predictable structure of the sequences encompassed by the claimed invention.

Applicants note that the description of a representative number of species does not require the description to be of such specificity that it would provide individual support for each

species that the genus embraces. 66 Fed. Reg. 1099, 1106 (2001). Satisfactory disclosure of a "representative number" depends on whether one of skill in the art would recognize that the applicant was in possession of the necessary common attributes or features of the elements possessed by the members of the genus in view of the species disclosed. 66 Fed. Reg. 1099, 1106 (2001). Applicants submit that the knowledge and level of skill in the art would allow a person of ordinary skill to envision the claimed invention, *i.e.*, a nucleotide sequence having at least 90% sequence identity to the sequence set forth in SEQ ID NO:1, or hybridizing to a nucleic acid consisting of the nucleotide sequence set forth in SEQ ID NO:1 under the specified conditions.

The description of a claimed genus can be by structure, formula, chemical name, or physical properties. *See, Ex parte Maizel*, 27 USPQ2d 1662, 1669 (B.P.A.I. 1992), citing *Amgen v. Chugai*, 927 F.2d 1200, 1206 (Fed. Cir. 1991). A genus of DNAs may therefore be described by means of a recitation of a representative number of DNAs defined by nucleotide sequence and falling within the scope of the genus, *or* by means of a recitation of structural features common to the genus, which features constitute a substantial portion of the genus. *See, Regents of the University of California v. Eli Lilly & Co.*, 119 F.3d 1559, 1569 (Fed. Cir. 1997); *see also* Guidelines for Examination of Patent Applications Under the 35 U.S.C. 112, First Paragraph, "Written Description" Requirement, 66 Fed. Reg. 1099, 1106 (2001). The recitation of a predictable structure of at least 90% sequence identity to SEQ ID NO: 1, or hybridization to SEQ ID NO:1 under the specified conditions, is sufficient to satisfy the written description requirement.

An Applicant, however, may also rely upon functional characteristics in the description, provided there is a correlation between the function and structure of the claimed invention. *See Id.*, citing *Lilly* at 1568. To expedite prosecution, independent claims 1, 42, 48, and 54 (and thus claims dependent thereon) have been amended to further recite functional characteristics of the claimed genus. Specifically, these claims recite that the claimed sequences encode a polypeptide which is pesticidal for at least one pest belonging to the order Coleoptera, thereby providing a functional characterization of the sequences claimed in the genus.

Applicants further note that the Federal Circuit has explicitly stated that

> *Eli Lilly* did not hold that all functional descriptions of genetic material necessarily fail as a matter of law to meet the written description requirement; rather, the requirement may be satisfied if in the knowledge of the art the disclosed function is sufficiently correlated to a particular, known structure.

Amgen, Inc. v. Hoechst Marion Roussel, Inc., 314 F.3d 1313, 1332, 65 USPQ2d 1385, 1398 (Fed. Cir. 2003). *See also, Moba, B.V. v. Diamond Automation, Inc.*, 325 F.3d 1306, 1320, 66 USPQ2d 1429, ____ (noting that "[i]n more recent cases, however, this court has distinguished *Lilly"* and further noting that in *Enzo Biochem, Inc. v. Gen-Probe, Inc.*, 323 F.3d 956 (Fed. Cir. 2002), "neither the specification nor the deposited biological material recited the precise 'structure, formula, chemical name, or physical properties' required by *Lilly.*")

Example 14 of the "Synopsis of Application of Written Description Guidelines" is directed to a generic claim: a protein having at least 95% sequence identity to the sequence of SEQ ID NO:3, wherein the sequence catalyzes the reaction A → B. The synopsis materials conclude that the generic claim of Example 14 is sufficiently described under § 112, first paragraph, because: 1) "the single sequence disclosed in SEQ ID NO:3 is representative of the genus"; and 2) the claim recites a limitation requiring the compound to catalyze the reaction from A → B. The synopsis materials conclude that one of skill in art would recognize that the Applicants were in possession of the necessary common attributes possessed by the members of the genus.

Following the analysis of Example 14, Applicants submit that the present claims satisfy the written description requirements of § 112, first paragraph. Specifically, the claims of the present invention encompass sequences having at least 90% sequence identity to SEQ ID NO:1 or that hybridize to a nucleic acid consisting of the nucleotide sequence set forth in SEQ ID NO:1 under the specified conditions, wherein the encoded polypeptide is pesticidal for at least one pest belonging to the order Coleoptera. As in Example 14, the specification discloses the nucleic acid sequence of SEQ ID NO:1 and claims recite a limitation requiring the compound to have a specific function (*i.e.*, pesticidal activity). Consequently, contrary to the conclusion stated in the Office Action, the sequences encompassed by genus claim 21 are defined by relevant

identifying physical and chemical properties. In fact, the common attributes or features of the elements possessed by the members of the genus is that they encode polypeptides having pesticidal activity against at least one pest of the order Coleoptera and share at least 90% sequence identity at the nucleotide level to the disclosed nucleotide sequence of SEQ ID NO:1 or hybridize under specified conditions to a nucleic acid consisting of the nucleotide sequence of SEQ ID NO:1. The necessary common features of the claimed genus are clear.

In summary, the description of a representative number of species *does not* require the description to be of such specificity that it would provide individual support for each species that the genus embraces. Applicants submit that the relevant identifying physical and chemical properties of the disclosed genus would be clearly recognized by one of skill in the art and consequently, the Applicant was in possession of the necessary common attributes or features of the elements possessed by the members of the genus. Accordingly, the rejection of claims 1-3, 9-12, 17-19, 38, 41-43, 46-49, and 52-54 under 35 U.S.C. §112, first paragraph, for lack of written description should be withdrawn and not applied to the newly submitted claims.

The Rejection of Claims Under 35 U.S.C.§112, Second Paragraph, Should Be Withdrawn

The Office Action (3/12/03, page 8, #11) has rejected claims 17-19, 41-42, and 47-54 as being indefinite. Applicants note that claims 41, 47, and 53 have been cancelled and therefore the rejection is moot as to those claims. Claims 42, 48, and 54 (and thus claims dependent thereon) have been amended to recite particular hybridization and wash conditions. Claims 17-19 have been amended to recite the additional step that an insect pest feeding on said plant or cell thereof is impacted. Applicants believe that in view of these cancellations and amendments, the rejection should be withdrawn and not applied to the newly submitted claims.

The Rejection of Claims Under 35 U.S.C. §102(b) Should Be Withdrawn

The Office Action (3/12/03, page 9, #13) has rejected claims 42, 48, and 54 under 35 U.S.C. §102(b) as anticipated by Michaels *et al.* (1996, U.S. Pat. No. 5,554,534). This rejection is respectfully traversed. Claims 42, 48, and 54 have been amended to recite high-stringency

hybridization and wash conditions, as described in the specification particularly on page 32. Applicants note that the sequence search results cited by the Examiner indicate a "query match" between SEQ ID NO:1 and the Michaels sequence of only 70.8%, and sequences sharing only 70.8% sequence identity would not be expected to hybridize to each other under high stringency conditions. Accordingly, the rejection of the claims under 35 U.S.C. §102 should be withdrawn and not applied to the new claims.

Consideration Of Previously Submitted Information Disclosure Statement

It is noted that an initialed copy of the PTO Form 1449 that was submitted with Applicants' Information Disclosure Statement filed December 17, 2002 has not been returned to Applicants' representative with the Office Action. Accordingly, it is requested that an initialed copy of the Form 1449 be forwarded to the undersigned with the next communication from the PTO. In order to facilitate review of the references by the Examiner, a copy of the Information Disclosure Statement and the Form 1449 are attached hereto. Copies of the cited references were provided at the time of filling the original Information Disclosure Statement, and, therefore, no additional copies of the references are submitted herewith. Applicants will be pleased to provide additional copies of the references upon the Examiner's request if it proves difficult to locate the original references.

CONCLUSION

In view of the above amendments and remarks, Applicants submit that the rejections of the claims under 35 U.S.C. §§112, first and second paragraphs and § 102(b) are overcome. Applicants respectfully submit that this application is now in condition for allowance. Early notice to this effect is solicited.

If in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject Application, the Examiner is invited to call the undersigned.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of

this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,

Leigh W. Thorne
Registration No. 47,992

Customer No. 29122
ALSTON & BIRD LLP
Bank of America Plaza
101 South Tryon Street, Suite 4000
Charlotte, NC 28280-4000
Tel Raleigh Office (919) 862-2200
Fax Raleigh Office (919) 862-2260

"Express Mail" mailing label number EV 185285309 US
Date of Deposit May 29, 2003

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to: Mail Stop Non-Fee Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450

Lynda-Jo Pixley